

# Bachelors level soil science training at land grant institutions in the USA and its territories

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## Core Ideas

- Loss or gain of academic programs is important in evaluating soil science's status
- Program lists that allow evaluation of changes over time do not currently exist
- Guidelines for determining bachelors level soil science programs are proposed
- A baseline for land grant institutions is provided for future comparisons

## Abstract

Concern over the status of soil science education in the USA has led to a number of publications in recent years that track trends in student enrollment and offer suggestions for attracting more students to soil science. However, there is little information about changes in the number of degree programs that prepare students for careers as soil scientists, and such changes are obviously an important measure of the status of our field. This study established criteria to identify bachelor's degree programs that prepare students for soil science careers and used websites at land grant colleges to review the degree offerings of these schools in USA states and territories to determine if they met the established criteria. Fifty-nine land grant colleges were identified that offer bachelor's degree programs that prepare students for soil science careers, with a total of 61 degree programs since two of the schools had two separate bachelor's degrees that met the established criteria. This study provides guidelines for conducting similar future studies and a baseline against which they can be compared to allow us to determine whether we are gaining or losing soil science programs at the land grant colleges over time.

25

26 **Keywords:** soil science education; soil science degree programs; land grant institutions; soil scientist  
27 qualifications

28

29 **Abbreviations list:** B.S. – Bachelor of Science; OPM - Office of Personnel Management; SSSA – Soil  
30 Science Society of America; USA – United States of America; USDA – United States Department of  
31 Agriculture

32

### 33 **Introduction**

34 There has been considerable interest in the status of soil science education in the USA over the last ~30  
35 years. Much of this interest has focused on trends in student enrollment numbers, with declining  
36 enrollment noted for many programs from the early 1990s through early 2000s (Baveye et al., 2006;  
37 Collins, 2008), and what might be done about these declines (Brevik, 2009; Havlin et al., 2010; Miller,  
38 2011; Taskey, 1994). The declining soil science student enrollment noted by Baveye et al. (2006)  
39 occurred despite the fact that overall undergraduate enrollment at universities in the USA increased by  
40 about 11% over essentially the same time period (U.S. Department of Education, 2013). As we moved  
41 into the second decade of the 2000s there was evidence that student enrollment was growing again  
42 (Brevik et al., 2014). However, as noted by Brevik et al. (2018), an important piece of the puzzle is  
43 missing: while investigations to date have addressed student numbers in existing soil science programs,  
44 they have not addressed whether we are losing, gaining, or holding steady in regards to the number of  
45 soil science programs that are offered. If we are losing programs that train students for careers in soil  
46 science it is possible that the total number of students training to be soil scientists could be on the  
47 decline, even if average enrollment in individual programs is on the rise. In a study of trends at 14  
48 universities over a seven year period, Brevik et al. (2014) noted that one of the universities in their study

49 added an undergraduate soil science program during the time period covered by their study while  
50 another dropped their undergraduate soil science program, creating a neutral situation regarding  
51 program numbers within the confines of the study. However, more complete studies are needed.

52

53 Soil science in the USA has been strongly associated with agriculture throughout its academic history  
54 (Havlin et al., 2010), and much of the teaching of soil science in the USA has occurred at land grant  
55 colleges (Brevik, 2009; Brevik et al., 2014). The foundation for land grant colleges was created in 1862  
56 with the passage of the Morrill Act, which provided states with public land they could use to raise funds  
57 to support one or more colleges. This means of funding led to the term “land grant colleges”. At a later  
58 date land was also provided to the District of Columbia and U.S. territories. Institutions that received  
59 funding under the 1862 Morrill Act’s provisions are known as 1862 colleges. In 1890 the second Morrill  
60 Act was passed, which provided annual funding to support each land grant college. The second act also  
61 banned racial discrimination in regards to admissions at the land grant colleges, but a state was allowed  
62 to establish separate land grant colleges with their funding as a way to provide educational access to all.  
63 This led to the creation of several land grant colleges focused on educating African American students,  
64 known as the 1890 land grant colleges (Earl et al., 1995). In 1994 a group of Native American colleges  
65 also received land grant status, providing them with resources from the federal government  
66 (Ramaswamy, 2015). In all cases, the over-arching goal of the Morrill Act was to make higher education  
67 available to all people from all social classes, so that a college education was not just available to the  
68 wealthy. Today there are 59 1862, 18 1890, and 34 1994 colleges, for a total of 111 land grant colleges  
69 (USDA, 2018).

70

71 While their mission and offerings have evolved over time, land grants were originally developed to teach  
72 the practical skills of agriculture and the mechanical arts (engineering) (Earl et al., 1995). Because of this,

73 the land grant colleges seem to be a logical place to start in an investigation of the status of soil science  
74 programs in the USA. To fully understand the status of soil science education in the USA we need to  
75 have information on changes in the number of programs that train students for soil science careers over  
76 time. Therefore, this study was undertaken in an attempt to provide a baseline for the number of  
77 Bachelor of Science (B.S.) level programs that train students for careers in soil science at land grant  
78 institutions in the USA and its territories. The study also proposes a standard to use in determining what  
79 constitutes a B.S. level program that trains students for a soil science career.

80

### 81 **Materials and Methods**

82 Degree programs that prepare a student for a career in soil science are offered under a variety of  
83 different names (Brevik et al., 2014). Therefore, it was necessary to establish a set of standard criteria  
84 that had to be met to consider a B.S. degree program one that prepared a student to work in soil  
85 science. For the purposes of this study, the USA Federal government's Office of Personnel Management  
86 (OPM) criteria to hire an individual as a soil scientist (Soil Science Series, 0470) was used. This criteria is a  
87 degree in "soil science or a closely related discipline that included 30 semester hours or equivalent in  
88 biological, physical, or earth science, with a minimum of 15 semester hours in such subjects as soil  
89 genesis, pedology, soil chemistry, soil physics, and soil fertility." (OMP, 2018). For institutions that used  
90 the quarter system, the standards in this study were 45 and 23 quarter hours, respectively.

91

92 A current list of land grant colleges was obtained from the United States Department of Agriculture  
93 (USDA) (USDA, 2018). The website for each college was visited in November and December 2018,  
94 therefore, the results of this study represent soil science program standings at land grant colleges as of  
95 December 2018. The course descriptions in the undergraduate catalogs for each land grant college were  
96 reviewed to determine if the college offered at least 15 semester hours (23 quarter hours) of

97 undergraduate soil science coursework. If they did, the catalog was then searched for any  
98 undergraduate degrees that met the OPM requirements. If such a degree program was located, the title  
99 of the degree was recorded.

100

101 Any degrees that allowed a student to meet the OPM criteria within the established program were  
102 considered to meet the soil science training requirements. For example, in the case of degrees such as  
103 agronomy or environmental science, there were cases where not all the students who graduated from a  
104 given school would necessarily qualify to work for the federal government as a soil scientist. However, if  
105 the agronomy or environmental science degree provided students with the ability to take enough soil  
106 science and supporting natural science coursework as specifically listed degree electives to meet the  
107 OPM soil scientist requirements then it was considered to be a degree that prepared students for a  
108 career as a soil scientist. Soil science minors were not considered in this study. If a university had, for  
109 example, a B.S. level agronomy or environmental science degree that did not allow a student to meet  
110 the OPM qualifications to work as a soil scientist but did have a soil science minor that, combined with  
111 the agronomy or environmental science degree, would meet the OPM requirements, that school was  
112 not considered to have an undergraduate program that prepared students for a career in soil science.  
113 This is not saying that such an approach is not a legitimate way to give students the ability to pursue a  
114 soil science career, but in this study the agronomy or environmental science degree plus soil science  
115 minor were considered to be two separate programs a student would need to complete to get such  
116 qualifications.

117

## 118 **Results and Discussion**

### 119 *Current Status at Land Grant Colleges*

120 A total of 59 land grant colleges in 46 states and one territory were identified that offered 61 B.S. level  
 121 degrees that qualified graduates to work as a soil scientist at the federal level (Tables 1, 2). There were  
 122 61 degrees at the 59 colleges because two separate degree programs were identified at two of the  
 123 schools that met the OPM requirements. In both cases one of the degrees was agriculturally focused  
 124 while the other had an environmental science focus. Of the 59 colleges, 48 were 1862 colleges and 11  
 125 were 1890 colleges. Therefore, 81% of the 1862 and 61% of the 1890 land grant colleges offered a B.S.  
 126 degree that prepares students for a career in soil science. None of the 1994 land grant colleges offered a  
 127 B.S. degree that met the OPM requirements for a graduate to work as a soil scientist.  
 128

Table 1. Land grant institutions in the USA and its territories and whether or not they offer soil science training that leads to a bachelor's degree that meets the Soil Science series, 0470 criteria. Identification of land grant institutions is based on USDA (2018) and Earl et al. (1995).

| University                           | State/Territory                | Type of Land Grant | B.S. |
|--------------------------------------|--------------------------------|--------------------|------|
| Alabama A&M University               | Alabama                        | 1890               | yes  |
| Auburn University                    | Alabama                        | 1862               | yes  |
| Tuskegee University                  | Alabama                        | 1890               | yes  |
| Ilisagvik College                    | Alaska                         | 1994               | no   |
| University of Alaska                 | Alaska                         | 1862               | no   |
| American Samoa Community College     | American Samoa                 | 1862               | no   |
| Diné College                         | Arizona                        | 1994               | no   |
| Tohono O'Odham Community College     | Arizona                        | 1994               | no   |
| University of Arizona                | Arizona                        | 1862               | yes  |
| University of Arkansas               | Arkansas                       | 1862               | yes  |
| University of Arkansas at Pine Bluff | Arkansas                       | 1890               | yes  |
| University of California, Berkeley   | California                     | 1862               | no   |
| University of California, Davis      | California                     | 1862               | yes  |
| University of California, Riverside  | California                     | 1862               | yes  |
| Colorado State University            | Colorado                       | 1862               | yes  |
| University of Connecticut            | Connecticut                    | 1862               | no   |
| Delaware State University            | Delaware                       | 1890               | no   |
| University of Delaware               | Delaware                       | 1862               | yes  |
| University of District Columbia      | District of Columbia           | 1862               | no   |
| Community College of Micronesia      | Federated States of Micronesia | 1862               | no   |
| Florida A & M University             | Florida                        | 1890               | yes  |
| University of Florida                | Florida                        | 1862               | yes  |
| Fort Valley State University         | Georgia                        | 1890               | yes  |
| University of Georgia                | Georgia                        | 1862               | yes  |

|  |               |      |     |
|--|---------------|------|-----|
| University of Guam                         | Guam          | 1862 | no  |
| University of Hawaii                       | Hawaii        | 1862 | yes |
| University of Idaho                        | Idaho         | 1862 | yes |
| University of Illinois at Urbana-Champaign | Illinois      | 1862 | yes |
| Purdue University                          | Indiana       | 1862 | yes |
| Iowa State University                      | Iowa          | 1862 | yes |
| Haskell Indian Nations University          | Kansas        | 1994 | no  |
| Kansas State University                    | Kansas        | 1862 | yes |
| Kentucky State University                  | Kentucky      | 1890 | no  |
| University of Kentucky                     | Kentucky      | 1862 | yes |
| Louisiana State University                 | Louisiana     | 1862 | yes |
| Southern University and A&M College        | Louisiana     | 1890 | yes |
| University of Maine                        | Maine         | 1862 | yes |
| University of Maryland College Park        | Maryland      | 1862 | yes |
| University of Maryland Eastern Shore       | Maryland      | 1890 | no  |
| University of Massachusetts Amherst        | Massachusetts | 1862 | yes |
| Bay Mills Community College                | Michigan      | 1994 | no  |
| Keweenaw Bay Ojibwa Community College      | Michigan      | 1994 | no  |
| Michigan State University                  | Michigan      | 1862 | yes |
| Saginaw Chippewa Tribal College            | Michigan      | 1994 | no  |
| Fond Du Lac Tribal & Community College     | Minnesota     | 1994 | no  |
| Leech Lake Tribal College                  | Minnesota     | 1994 | no  |
| University of Minnesota                    | Minnesota     | 1862 | yes |
| White Earth Tribal and Community College   | Minnesota     | 1994 | no  |
| Alcorn State University                    | Mississippi   | 1890 | yes |
| Mississippi State University               | Mississippi   | 1862 | yes |
| Lincoln University                         | Missouri      | 1890 | no  |
| University of Missouri                     | Missouri      | 1862 | yes |
| Aaniih Nakoda College                      | Montana       | 1994 | no  |
| Blackfeet Community College                | Montana       | 1994 | no  |
| Chief Dull Knife Community College         | Montana       | 1994 | no  |
| Fort Peck Community College                | Montana       | 1994 | no  |
| Little Big Horn College                    | Montana       | 1994 | no  |
| Montana State University                   | Montana       | 1862 | yes |
| Salish Kootenai College                    | Montana       | 1994 | no  |
| Stone Child College                        | Montana       | 1994 | no  |
| Little Priest Tribal College               | Nebraska      | 1994 | no  |
| Nebraska Indian Community College          | Nebraska      | 1994 | no  |
| University of Nebraska                     | Nebraska      | 1862 | yes |
| University of Nevada, Reno                 | Nevada        | 1862 | no  |
| University of New Hampshire                | New Hampshire | 1862 | yes |
| Rutgers University                         | New Jersey    | 1862 | yes |
| Institute of American Indian Arts          | New Mexico    | 1994 | no  |
| Navajo Technical University                | New Mexico    | 1994 | no  |
| New Mexico State University                | New Mexico    | 1862 | yes |

|   |                          |      |     |
|---|--------------------------|------|-----|
| Southwest Indian Polytechnic Institute            | New Mexico               | 1994 | no  |
| Cornell University                                | New York                 | 1862 | yes |
| North Carolina A&T State University               | North Carolina           | 1890 | yes |
| North Carolina State University                   | North Carolina           | 1862 | yes |
| Cankdeska Cikana Community College                | North Dakota             | 1994 | no  |
| North Dakota State University                     | North Dakota             | 1862 | yes |
| Nueta Hidatsa Sahnish College                     | North Dakota             | 1994 | no  |
| Sitting Bull College                              | North Dakota             | 1994 | no  |
| Turtle Mountain Community College                 | North Dakota             | 1994 | no  |
| United Tribes Technical College                   | North Dakota             | 1994 | no  |
| Northern Marianas College                         | Northern Mariana Islands | 1862 | no  |
| Central State University                          | Ohio                     | 1890 | no  |
| Ohio State University                             | Ohio                     | 1862 | yes |
| College of the Muscogee Nation                    | Oklahoma                 | 1994 | no  |
| Langston University                               | Oklahoma                 | 1890 | no  |
| Oklahoma State University                         | Oklahoma                 | 1862 | yes |
| Oregon State University                           | Oregon                   | 1862 | yes |
| Pennsylvania State University                     | Pennsylvania             | 1862 | yes |
| University of Puerto Rico                         | Puerto Rico              | 1862 | yes |
| University of Rhode Island                        | Rhode Island             | 1862 | yes |
| Clemson University                                | South Carolina           | 1862 | yes |
| South Carolina State University                   | South Carolina           | 1890 | no  |
| Oglala Lakota College                             | South Dakota             | 1994 | no  |
| Sinte Gleska University                           | South Dakota             | 1994 | no  |
| Sisseton Wahpeton Community College               | South Dakota             | 1994 | no  |
| South Dakota State University                     | South Dakota             | 1862 | yes |
| Tennessee State University                        | Tennessee                | 1890 | yes |
| University of Tennessee                           | Tennessee                | 1862 | yes |
| Prairie View A&M University                       | Texas                    | 1890 | yes |
| Texas A&M University                              | Texas                    | 1862 | yes |
| Utah State University                             | Utah                     | 1862 | yes |
| The University of Vermont                         | Vermont                  | 1862 | yes |
| University of the Virgin Islands                  | Virgin Islands           | 1862 | no  |
| Virginia Polytechnic Institute & State University | Virginia                 | 1862 | yes |
| Virginia State University                         | Virginia                 | 1890 | yes |
| Northwest Indian College                          | Washington               | 1994 | no  |
| Washington State University                       | Washington               | 1862 | no  |
| West Virginia University                          | West Virginia            | 1862 | yes |
| College of the Menominee Nation                   | Wisconsin                | 1994 | no  |
| Lac Courte Oreilles Ojibwa Community College      | Wisconsin                | 1994 | no  |
| University of Wisconsin–Madison                   | Wisconsin                | 1862 | yes |
| University of Wyoming                             | Wyoming                  | 1862 | yes |
| Totals  | 111                      |      | 59  |

Table 2. Common names of degrees offered by land grant institutions that prepare students for careers as soil scientists at the undergraduate level.

| General academic area                        | Specific degree names included in the category   |
|--|--|
| Agriculture                                  | Agricultural and Environmental Systems - Sustainable Land Management; Agricultural Sciences (with various concentrations, emphases, and options); Agriculture (with various concentrations, emphases, and options); Agriculture and Natural Resources; Ecological Agriculture; Sustainable Agriculture   |
| Agronomy                                     | Agronomic Sciences; Agronomy (with various concentrations, emphases, or options)   |
| Crop/Plant/Soil Sciences                     | Crop and Soil Environmental Sciences - Agronomy option; Crop and Soil Science(s) (with various concentrations, emphases, and options); Plant and Soil Systems; Plant and Environmental Sciences - Soil and Water Science concentration; Plant and Environmental Soil Science - Soil & Water emphasis; Plant and Soil Science(s); Plant Science(s) (with various concentrations, emphases, and options); Soil and Crop Sciences; Tropical Plant and Soil Sciences - Environmental Soil Sciences option  |
| Environmental Sciences and Natural Resources | Environmental and Sustainability Sciences - Individual Student Designed Concentration; Environmental, Natural Resource and Plant Sciences, Environmental Sciences Option; Environmental Resource Management - Soil Science option; Environmental Science(s) (with various concentrations, emphases, and options); Environmental Science and Management (with various concentrations, emphases, and options); Environmental Science and Technology - Soil and Watershed Science concentration; Environmental Sciences, Policy and Management - Conservation and Resource Management track; Natural Resources and Environmental Sciences (with various concentrations, emphases, or options) |
| Environmental Soil Sciences                  | Environmental and Soil Sciences - Soil Science concentration; Environmental Soil and Water Science(s); Environmental Soil Science  |
| Soil Science, Soil and Water Sciences        | Soil and Hydrologic Sciences; Soil and Water Sciences - Soil Science Specialization; Soil Science; Water and Soil Resources  |
| Others                                       | Agroecology; Land, Plant, and Climate Systems  |

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131 Some of the colleges identified in Table 1 are community colleges. They were included in the study for  
 132 two reasons. First, some community colleges offer limited B.S. degree programs. This is particularly true  
 133 of the 1994 land grants. Most of the 1994 colleges started off as community colleges offering 2-year  
 134 associates degree programs and the majority of their programs are still at the associates level (Kicking  
 135 Woman, 2011), but they are increasingly offering B.S. and even masters level degrees with many new  
 136 such programs added just in the last few years (Page, 2017). Second, all colleges currently recognized as  
 137 land grant colleges are listed in Table 1. Therefore, the community colleges were investigated to provide

138 complete coverage of all land grant colleges and to evaluate whether any of the limited B.S. degree  
139 offerings that might be offered at these institutions met the OPM 0470 series criteria.

140

#### 141 *Potential Alternative Criteria*

142 There are other criteria that could have been used to determine programs that prepare graduates to  
143 work as soil scientists. The strictest would be to look for B.S. degrees specifically in “Soil Science”. At the  
144 time of this study there were only three B.S. level Soil Science degrees at the land grant colleges, offered  
145 by New Mexico State University, North Dakota State University, and the University of Wisconsin. This  
146 represents 5% of the degrees that met the OPM soil science requirements. If various combinations of  
147 soil and water science were used three more degrees would be added, for a total of six (10% of the  
148 degrees that met OPM requirements). An additional four degrees had names with some variation of  
149 environmental soil science (10 total degrees, 16% of the degrees that met OPM requirements). And if  
150 including “soil” in the primary name of the degree (e.g., Crop and Soil Sciences, Plant and Soil Science,  
151 etc.) was used as the criteria 10 more degrees would be added, giving a total of 20 B.S. level “soil  
152 science” degrees at the land grant colleges (33% of the degrees identified in this study). The remaining  
153 41 degrees (67%) that were identified were either soil science concentrations, emphases, or options in  
154 related degree programs (e.g., Agricultural Sciences - Plant and Soil Science concentration; Agronomy -  
155 Soil Science option; Environmental Sciences - Land and Soil emphasis, etc.) or did not have the term soil  
156 anywhere in the degree, concentration, emphasis, or option title (e.g., Agriculture and Natural  
157 Resources; Agroecology; Agronomy; Environmental Science and Management, etc.). Of these, 24 (39%  
158 of the total degrees) had a name with some variation of a soil concentration, emphasis, or option, while  
159 17 (28%) of the degrees that met the OPM requirements did not mention soil anywhere in the degree  
160 name. A numerical summary of the name categories for degrees that met the OPM requirements is  
161 given in Table 3. It was decided to use broader criteria than just degrees titled “soil science” or with

Table 3. Subject areas under which degrees that qualify a graduate to work as a soil scientist are offered at land grant institutions in the USA and its territories.

|         | Agricultural Sciences | Agronomy | Crop/Plant/<br>Soil Sciences | Environmental Sciences<br>and Natural Resources | Environmental<br>Soil Science | Soil Science and Soil<br>and Water Sciences | Others | Total |
|---------|-----------------------|----------|------------------------------|---|-------------------------------|---|--------|-------|
| Number  | 12                    | 6        | 13                           | 17  | 4                             | 6   | 3      | 61    |
| Percent | 20                    | 10       | 21                           | 28  | 7                             | 10  | 4      | 100   |

162 “soil” or “soil science” in the name for this study. The goal of this study was to determine which schools  
163 offered degrees that prepare graduates with a B.S. degree to work as soil scientists, and the OPM  
164 criteria clearly state that the federal government will hire individuals with related degrees that include  
165 enough credit hours in soil science to work as soil scientists. The same is also occurring in the hiring of  
166 soil science faculty at universities across the USA (Brevik and Vaughan, 2018; Brevik and Vaughan, 2019),  
167 and Ferris et al. (2010) noted that there is little uniformity in the degrees that prepare students to  
168 pursue a career in soil science.

169

170 Another set of criteria that could have been used to define programs that prepare students for careers  
171 as soil scientists is the Certified Professional Soil Scientist (CPSS) criteria established by the Soil Science  
172 Society of America (SSSA), which state that an individual must have a minimum of a B.S. degree in Soil  
173 Science or a related area that includes at least 15.0 semester credits of soil science coursework (SSSA,  
174 2018). This is similar to the Federal government’s criteria, but is less restrictive in that it does not  
175 explicitly require at least 30 semester hours or equivalent in biological, physical, or earth science, with a  
176 minimum of 15 semester hours in soil science topics. Because of their similarity, using the CPSS criteria  
177 would produce results that are very similar to those created using the OPM requirements.

178

179 From 2009 through about 2013 SSSA had a “Committee on Accreditation of Soil Science Programs at U.S.  
180 Universities” that was charged with determining whether universities that offered soil science  
181 preparatory programs would be interested in an accreditation program and, if so, develop the guidelines  
182 for such a program (SSSA, 2009). Guidelines were developed and approved by the SSSA Board (SSSA  
183 written communication, 9 April 2018). The developed guidelines required, among other things, 15  
184 semester hours of soil science core courses, 45 semester credits of supporting professional core courses  
185 in subjects including 1) agricultural science, 2) biological and ecological sciences, 3) chemistry,

186 mathematics, physics, and statistics, 4) communications, 5) geoscience and atmospheric science, 6)  
187 human health and land use, 7) technology and engineering, and 8) water sciences (at least 5 semester  
188 credits in four of the eight areas), various measurements of faculty quality, the university's commitment  
189 to the soil science program, and the covering of identified core concepts in the classes offered (SSSA  
190 written communication, 9 April 2018). This plan has not been implemented to date so it is impossible to  
191 know which of the universities that offer soil science programs would meet the requirements, therefore,  
192 its guidelines were not used in this study. However, if such a plan is ever implemented it would provide  
193 another possible guideline for evaluating undergraduate programs.

194

#### 195 *Future Needs*

196 This study evaluated programs that prepare students to work as soil scientists at the land grant colleges.  
197 There are other colleges in the USA that offer degrees that prepare students to work as soil scientists.  
198 Seventeen colleges have been identified so far in a start to investigating non-land grant colleges that  
199 offer degrees that meet the OPM soil science requirements (Table 4). This indicates there is a definite  
200 need to expand the current study to non-land grant institutions. However, completing this evaluation  
201 will mean going through the course catalogs of each of the approximately 3,500 colleges in the USA that  
202 are currently accredited by one of the regional accrediting bodies (Table 5), an undertaking that will  
203 require some time.

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Table 4. Examples of non-land grant colleges in the USA that offer degree programs that meet the OPM soil science series requirements. Colleges were identified based on the author's personal knowledge of schools likely to have a qualifying degree program, and were then checked using the same procedure and criteria used for the land grant colleges.

| University   | State        | General Academic Area†                       |
|--|--------------|--|
| California Polytechnic State University, San Luis Obispo | California   | Environmental Soil Sciences                  |
| Humboldt State University                                | California   | Others                                       |
| BYU - Idaho  | Idaho        | Agronomy                                     |
| Illinois State University                                | Illinois     | Crop/Plant/Soil Sciences                     |
| Northern Illinois University                             | Illinois     | Others                                       |
| Southern Illinois University at Carbondale               | Illinois     | Crop/Plant/Soil Sciences                     |
| Western Kentucky University                              | Kentucky     | Agronomy                                     |
| Dickinson State University                               | North Dakota | Agriculture                                  |
| Delaware Valley College                                  | Pennsylvania | Environmental Sciences and Natural Resources |
| Tennessee Technological University                       | Tennessee    | Agriculture                                  |
| Tarleton State University                                | Texas        | Others                                       |
| Texas A&M - Kingsville                                   | Texas        | Environmental Soil Sciences                  |
| Texas Tech University                                    | Texas        | Crop/Plant/Soil Sciences                     |
| West Texas A&M University                                | Texas        | Crop/Plant/Soil Sciences                     |
| University of Wisconsin–Platteville                      | Wisconsin    | Crop/Plant/Soil Sciences                     |
| University of Wisconsin–River Falls                      | Wisconsin    | Crop/Plant/Soil Sciences                     |
| University of Wisconsin–Stevens Point                    | Wisconsin    | Others                                       |

† – based on the subdivisions given in Table 2

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Table 5. Regional accrediting agencies in the USA and the number of colleges they accredit.

| Accrediting Agency                                | Number of Schools Accredited | Website   |
|---|------------------------------|---|
| Board of Regents of the State of New York         | 248                          | <a href="http://www.regents.nysed.gov/">http://www.regents.nysed.gov/</a> |
| Higher Learning Commission                        | 1343                         | <a href="https://www.hlcommission.org/">https://www.hlcommission.org/</a> |
| Middle States Commission on Higher Education      | 523                          | <a href="https://www.msche.org/">https://www.msche.org/</a>               |
| New England Association of Schools and Colleges   | 236                          | <a href="https://www.neasc.org/">https://www.neasc.org/</a>               |
| Northwest Commission on Colleges and Universities | 162                          | <a href="http://www.nwccu.org/">http://www.nwccu.org/</a>                 |
| Southern Association of Colleges and Schools      | 795                          | <a href="http://www.sacscoc.org/">http://www.sacscoc.org/</a>             |
| Western Association of Schools and Colleges       | 207                          | <a href="https://www.wscuc.org/">https://www.wscuc.org/</a>               |

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## 213 **Conclusions**

214 There has been considerable concern over the last 30 years regarding student numbers in soil science  
215 degree programs. Past studies have looked at the number of majors in soil science programs and  
216 enrollment in classes, but little effort has been put into evaluating the number of programs in the USA  
217 that prepare students for careers as soil scientists. It is important that we make an effort to regularly  
218 document which universities in the USA are offering soil science preparatory programs so we can better  
219 understand how the soil science education picture is changing, including both periods of growth and  
220 decline. This study was conducted to establish published criteria by which such evaluations can be made  
221 and to create a baseline for land grant colleges against which future evaluations can be compared. A  
222 study such as this one should be done every 5-10 years, with well-defined criteria and a report of  
223 results, so that the number of soil science preparatory programs in the USA can be tracked. There is still  
224 a need to conduct a complete evaluation of the status of soil science preparatory programs at non-land  
225 grant colleges in the USA.

226

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